PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

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PCT/NL 9 8 / 0 0 0 1 4
International Application No.

0 8 JAN 1998 (08.01.98)
International Filing Date

BUREAU VOOR DE INDUSTRIËLE EIGENDOM
P.C.T. INTERNATIONAL APPLICATION
Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference (if desired) (12 characters maximum) T-13'

Box No. I TITLE OF INVENTION

Lifting Device with Movable Lifting Columns

Box No. II APPLICANT

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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This person is applicant for the purposes of: ☐ all designated States ☒ all designated States except the United States of America ☐ the United States of America only ☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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☒ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as: ☒ agent ☐ common representative

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Continuation of Box No. III FURTHER APPLICANTS AND/OR (FURTHER) INVENTORS

If none of the following sub-boxes is used, this sheet is not to be included in the request.

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

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State *(i.e. country)* of residence: The Netherlands

This person is applicant for the purposes of: [ ] all designated States [ ] all designated States except the United States of America [XX] the United States of America only [ ] the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

This person is:

- [ ] applicant only
- [ ] applicant and inventor
- [ ] inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality:

State *(i.e. country)* of residence:

This person is applicant for the purposes of: [ ] all designated States [ ] all designated States except the United States of America [ ] the United States of America only [ ] the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

This person is:

- [ ] applicant only
- [ ] applicant and inventor
- [ ] inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality:

State *(i.e. country)* of residence:

This person is applicant for the purposes of: [ ] all designated States [ ] all designated States except the United States of America [ ] the United States of America only [ ] the States indicated in the Supplemental Box

Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)*

This person is:

- [ ] applicant only
- [ ] applicant and inventor
- [ ] inventor only *(If this check-box is marked, do not fill in below.)*

State *(i.e. country)* of nationality:

State *(i.e. country)* of residence:

This person is applicant for the purposes of: [ ] all designated States [ ] all designated States except the United States of America [ ] the United States of America only [ ] the States indicated in the Supplemental Box

[ ] Further applicants and/or (further) inventors are indicated on another continuation sheet.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) *(mark the applicable check-boxes; at least one must be marked)*:

Regional Patent

- ☒ AP **ARIPO Patent:** **GH** Ghana, **GM** Gambia, **KE** Kenya, **LS** Lesotho, **MW** Malawi, **SD** Sudan, **SZ** Swaziland, **UG** Uganda, **ZW** Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ EA **Eurasian Patent:** **AM** Armenia, **AZ** Azerbaijan, **BY** Belarus, **KG** Kyrgyzstan, **KZ** Kazakhstan, **MD** Republic of Moldova, **RU** Russian Federation, **TJ** Tajikistan, **TM** Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP **European Patent:** **AT** Austria, **BE** Belgium, **CH and LI** Switzerland and Liechtenstein, **DE** Germany, **DK** Denmark, **ES** Spain, **FI** Finland, **FR** France, **GB** United Kingdom, **GR** Greece, **IE** Ireland, **IT** Italy, **LU** Luxembourg, **MC** Monaco, **NL** Netherlands, **PT** Portugal, **SE** Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ OA **OAPI Patent:** **BF** Burkina Faso, **BJ** Benin, **CF** Central African Republic, **CG** Congo, **CI** Côte d'Ivoire, **CM** Cameroon, **GA** Gabon, **GN** Guinea, **ML** Mali, **MR** Mauritania, **NE** Niger, **SN** Senegal, **TD** Chad, **TG** Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT *(if other kind of protection or treatment desired, specify on dotted line)* .....

National Patent *(if other kind of protection or treatment desired, specify on dotted line)*:

- ☒ AL Albania .....
- ☒ AM Armenia .....
- ☒ AT Austria .....
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- ☒ BA Bosnia and Herzegovina .....
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- ☒ BR Brazil .....
- ☒ BY Belarus
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- ☒ LT Lithuania
- ☒ LU Luxembourg
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- ☒ MK The former Yugoslav Republic of Macedonia .....
- ☒ MN Mongolia
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- ☒ MX Mexico .....
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- ☒ TR Turkey .....
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- ☒ UA Ukraine .....
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Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
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In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____.

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. *(Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)*

Box No. VI PRIORITY CLAIM Further priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) NL	08 January 1997 (08/01/1997)	1004956	
item (2)			
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): 1

Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) *(If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):* ISA / EP

Earlier search *Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request:*

Country (or regional Office):	Date (day/month/year):	Number:
NL	19/09/1997	SN 29093 NL

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

	1. request	: 4	sheets
NL	2. description	: 7	sheets
NL	3. claims	: 2	sheets
NL	4. abstract	: 1	sheets
	5. drawings	: 3	sheets
	Total	: 17	sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney
2. ☐ copy of general power of attorney
3. ☐ statement explaining lack of signature
4. ☐ priority document(s) *identified in Box No. VI as item(s):*
5. ☒ fee calculation sheet
6. ☐ separate indications concerning deposited microorganisms
7. ☐ nucleotide and/or amino acid sequence listing (diskette)
8. ☐ other *(specify)*:

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

January 8, 1998

't Jong, Bastiaan Jacobus (Agent)

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1. Date of actual receipt of the purported international application: 08 JAN 1998 (08.01.98)
2. Drawings: ☒ received: ☐ not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
4. Date of timely receipt of the required corrections under PCT Article 11(2):
5. International Searching Authority specified by the applicant: ISA /
6. ☐ Transmittal of search copy delayed until search fee is paid

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Date of receipt of the record copy by the International Bureau: 28 JANUARY 1998 (28.01.98)

T-13

HEFINRICHTING MET MOBIELE HEFKOLOMMEN

De uitvinding heeft betrekking op een hefinrichting die ten minste twee afzonderlijk verplaatsbare hefkolommen omvat, zoals beschreven in de aanhef van conclusie 1.

Een dergelijke hefinrichting is bekend en wordt in het bijzonder gebruikt voor het heffen van zware voertuigen, zoals vrachtwagens en autobussen.

Met de koppelleidingen worden de benodigde signalen voor het als een eenheid laten werken van alle hefkolommen doorgegeven. Deze signalen omvatten activeringssignalen voor het in- en uitschakelen van de aandrijfmiddelen van elke hefkolom maar ook controlesignalen ter vergelijking van de hefhoogte van elke hefkolom. Door de koppelleidingen worden de hefkolommen dus tot één hefinrichting met elkaar gekoppeld, die in hoofdzaak op dezelfde wijze functioneert als een gebruikelijke voertuighefbrug.

De uitvinding beoogt de bekende hefinrichting verder te ontwikkelen teneinde deze meer gebruiksmogelijkheden te geven.

Dit doel wordt bij de hefinrichting volgens de uitvinding bereikt met de maatregelen volgens het kenmerk van conclusie 1. Hierdoor worden de hefkolommen niet meer beschouwd als samenstellende delen van een gehele inrichting, doch als afzonderlijke inrichtingen die in willekeurige aantallen samenwerken. Met de uitvinding wordt bereikt dat een grote verscheidenheid aan stuur- en controlesignalen tussen de afzonderlijke hefkolommen onderling en met de bedieningsmiddelen uitgewisseld kan worden, waardoor de gebruiksmogelijkheden van de hefinrichting volgens de uitvinding sterk worden vergroot.

Een gunstig verdere ontwikkeling wordt gekenmerkt in conclusie 2. Door ook de beveiligingssignalen via de databus te communiceren wordt verzekerd dat een willekeurig aantal samenwerkende hefkolommen betrouwbaar en in het bijzonder met een grote veiligheid kunnen samenwerken.

Bij voorkeur wordt de maatregel van conclusie 3 toegepast. De CAN-databus en componenten daarvoor zijn goed gestandaardiseerd, zodat de besturings- en bedieningsmiddelen betrouwbaar kunnen worden opgebouwd en uitgevoerd. Doordat deze databus slechts twee draden vereist, blijven de koppelleidingen goed hanteerbaar en weinig kwetsbaar.

Door toepassing van de maatregel van conclusie 4 wordt bereikt dat de goede werking van alle hefkolommen vanuit de bedieningsmiddelen kan worden vastgesteld. Besturingssignalen voor het in werking stellen van de beveiligingsmiddelen kunnen in één richting in de gesloten kring worden verzonden, hetgeen een hoge betrouwbaarheid met zich meebrengt.

Volgens een verdere ontwikkeling wordt de maatregel van conclusie 5 toegepast. De gebruiker kan voor de bediening van de gehele inrichting de hefkolom selecteren die voor hem het meest geschikt is.

Met de maatregel van conclusie 6 kan de energievoorziening voor elk, of ten minste een aantal van de hefkolommen via de ten minste ene hefkolom geschieden. Het is bijvoorbeeld mogelijk om de voedingsspanningsleidingen zodanig te dimensioneren dat totaal vier hefkolommen via de ene hefkolom worden gevoed. De ten minste ene hefkolom kan daarbij voorzien zijn van overbelastingsbeveiligingsmiddelen, die voor het uitschakelen van de stroomvoorziening zorgdragen bij een overbelasting van enkele of alle gekoppelde hefkolommen.

Bij een geschikte uitvoering wordt de maatregel van conclusie 7 toegepast. De relatieve positie van elke hefkolom wordt hierdoor eenvoudig voor de bedieningsmiddelen herkenbaar.

Een zeer geschikte verdere toepassing is gekenmerkt in conclusie 8. Als paren worden bijvoorbeeld gekenmerkt de hefkolommen die aan weerszijden van eenzelfde voertuigas zijn opgesteld. Hierdoor wordt het bijvoorbeeld mogelijk om, wanneer een voertuig door meer dan vier hefkolommen wordt ondersteund, een as in of uit te bouwen door de twee bij één paar behorende hefkolommen afzonderlijk te bedienen.

Met de maatregel van conclusie 9 kan de afzonderlijke bediening van de tot een paar aan elkaar toegevoegde hefkolommen vanaf de bedieningsmiddelen eenvoudig worden uitgevoerd.

Door toepassing van de maatregel van conclusie 10 kunnen na instelling van één paar de overige samenwerkende paren eenvoudig door de bedieningsmiddelen worden herkend.

De uitvinding wordt verder toegelicht in de volgende beschrijving aan de hand van de bijgevoegde figuren.

Figuur 1 toont een hefinrichting volgens de onderhavige soort in de gebruikstoestand.

Figuur 2 toont een hefkolom van de hefinrichting van figuur 1.

Figuur 3 toont schematisch zes door koppelleidingen met elkaar gekoppelde hefkolommen.

De in figuur 1 getoonde hefinrichting 1 volgens de uitvinding omvat vier afzonderlijk verplaatsbare hefkolommen 2, die samenwerken voor het heffen van een autobus 4. Voor de samenwerking zijn de hefkolommen 2 met elkaar gekoppeld door middel van koppelleidingen 3 die deel uitmaken van een digitale databus van het CAN-type.

Zoals figuur 2 laat zien omvat elke hefkolom 2 een kolom 6 waarin een wagen 7 in langsrichting verschuifbaar is geleid. Aan het ondereinde van de kolom 6 is een steunvoet 8 aangebracht, waarmee de kolom stabiel op een grondoppervlak kan worden opgesteld.

De wagen 7 draagt aan zijn voeteinde een heforgaan 9, dat voorzien is van twee uitsteeksels 16 die om een voertuigwiel kunnen grijpen. De wagen 7 kan in de kolom 6 worden verplaatst door middel van aandrijfmiddelen in de vorm van een hydraulische cilinder 10. Deze hydraulische cilinder 10 wordt met hydraulische olie onder druk gevoed vanuit een hydraulisch aggregaat 11, dat op zichzelf bekend is en niet in detail is weergegeven. Een dergelijk hydraulisch aggregaat 11 omvat een door een elektromotor aangedreven hydraulische pomp, welke hydraulische olie uit een reservoir kan aanzuigen en onder druk in de cilinder 10 kan persen voor het omhoog bewegen van de wagen 7.

De besturing van het hydraulische aggregaat 11 geschiedt door op zichzelf bekende besturingsmiddelen die opgenomen zijn in een kast 14 aan de hefkolom 2.

Teneinde de hefkolom 2 te kunnen verplaatsen en te kunnen positioneren met de uitsteeksels 16 aan weerszijden van een voertuigwiel, is de hefkolom 2 voorzien van wielen 12. Deze wielen 12 vormen tezamen met de duwboom 13 een mechanisme dat op zichzelf bekend is voor palletwagens. Door het pompend op en neer bewegen van de duwboom 13 kunnen de wielen 12 ten opzichte van de steunvoet 8 naar beneden bewogen worden waardoor de hefkolom 2 op de wielen 12 verplaatsbaar wordt. Door het bedienen van een hydraulische klep worden de wielen 12 ingetrokken, waardoor de steunvoet 8 op de bodem komt te staan.

In de verrijdbare toestand kan de hefkolom 2 met behulp van de duwboom 13 worden gemanoeuvreerd.

De besturingsmiddelen 14 omvatten op zichzelf bekende schakelmiddelen voor het in- en uitschakelen van het hydraulisch aggregaat 11. Dit in- en uitschakelen wordt gecommandeerd door het activeren van bedieningsmiddelen 18. De besturingsmiddelen 14 voor elke hefkolom 2 en de bedieningsmiddelen 18 zijn zodanig uitgevoerd dat deze signalen kunnen uitwisselen via de koppelleidingen 3.

Elk van de hefkolommen 2 is, zoals figuur 1 toont, voorzien van een stuk leiding 3, dat aan zijn einde een connector draagt welke aangesloten wordt op een connectoraansluiting 15 van een aangrenzende hefkolom 2. De besturingsmiddelen 14 en bedieningsmiddelen 18 worden aldus in een reeks geschakeld zoals in figuur 3 is weergegeven is weergegeven voor een hefinrichting die zes hefkolommen omvat.

Bij de getoonde uitvoeringsvorm vormen telkens twee geleiders in de koppelleidingen 3 delen van een digitale CAN-databus. De koppelleidingen 3 kunnen verder nog geleiders omvatten voor de voedingsspanning van de hydraulische aggregaten.

Doordat de besturingsmiddelen en bedieningsmiddelen met elkaar gekoppeld zijn door middel van de CAN-databus, kan een verscheidenheid aan signalen naar en van elke hefkolom worden verzonden. Voor een goede samenwerking met de CAN-databus zijn de besturingsmiddelen gebaseerd op een microprocessor, zodat de verschillende mogelijkheden door programmering kunnen worden ingebracht.

Een geschikte mogelijkheid die in het bijzonder toegepast kan worden wanneer meer dan vier hefkolommen worden gebruikt, is het afzonderlijk laten heffen en dalen van bepaalde hefkolommen. Bijvoorbeeld kunnen de twee hefkolommen die aan weerszijden van een as van een voertuig zijn opgesteld gezamenlijk omhoog en omlaag bewogen worden, terwijl andere de ingestelde hoogte behouden, voor het verwisselen van een voertuigas.

Hiertoe wordt aan elk van de hefkolommen een volgnummer toegekend voor adressering van de stuursignalen. In figuur 3 zijn deze volgnummers schematisch aangegeven met I-VI. Het toekennen van deze volgnummers kan eenvoudig geschieden na het aanbrengen van de koppelleidingen 3. De bedieningsmiddelen 18 kunnen een geprogrammeerd bestuurde ondervraging over de databus uitvoeren teneinde vast te stellen hoeveel hefkolommen op de databus zijn aangesloten en vervolgens aan elk van deze

hefkolommen het volgnummer toekennen. De programmatuur kan zodanig zijn uitgevoerd dat vervolgens de telkens bij één as behorende hefkolommen aan elkaar worden toegevoegd tot afzonderlijk bedienbare paren. Bij het schema van figuur 3 kunnen bijvoorbeeld op geschikte wijze de met II en V aangeduide hefkolommen als een afzonderlijk paar worden bediend teneinde een door deze hefkolommen ondersteunde as afzonderlijk omhoog en omlaag te bewegen.

In figuur 3 is aangegeven dat elke kolom bedieningsmiddelen 18 draagt, zodat de gehele hefinrichting bij elke kolom kan worden bediend. Ook is het mogelijk de bedieningsmiddelen 18 als afzonderlijke eenheid uit te voeren die via een kabelverbinding signalen met de besturingsmiddelen 14 kan uitwisselen. De kabelverbinding kan bijvoorbeeld naar keuze met een willekeurige kolom worden gemaakt.

De koppelleidingen 3 zijn, zoals figuur 3 toont, in een gesloten kring geschakeld, waarbij telkens één hefkolom met een opvolgende is verbonden. Besturings- en beveiligingssignalen kunnen hierdoor via de gesloten ring teruggevoerd worden naar de operationele bedieningsmiddelen 18, waardoor een controle van de goede werking van alle aangesloten kolommen mogelijk wordt en de datastroom bijvoorbeeld in één richting kan geschieden, hetgeen tot een eenvoudige en daardoor betrouwbare uitvoering leidt.

Het tot een afzonderlijk bedienbaar paar aan elkaar toevoegen van bepaalde hefkolommen kan bij een minder ver ontwikkelde uitvoering van de uitvinding ook geschieden doordat een bedieningspersoon gegevens over de samenwerkende kolommen in de besturingsmiddelen invoert. Zo kan elke hefkolom voorzien zijn van een afzonderlijk bedienbaar instelorgaan dat na bediening de inrichting in een leerstand zet. Wanneer binnen een bepaalde tijd na de bediening van het instelorgaan op één kolom een overeenkomstig bedieningsorgaan op een andere kolom wordt bediend, zal de besturingsinrichting deze twee kolommen aan elkaar toevoegen als een afzonderlijk bedienbaar paar.

De uitvinding is niet beperkt tot de in de figuren weergegeven en hierboven beschreven uitvoeringsvormen. Door toepassing van de digitale databus, in combinatie met een geschikte programmering van de besturings- en bedieningsmiddelen kan een hefinrichting een voor een bepaalde toepassing gewenste functionaliteit worden gegeven.

Conclusies

1. Hefinrichting omvattende ten minste twee afzonderlijk verplaatsbare hefkolommen die elk een van een steunvoet voorziene kolom, een in langsrichting van deze kolom verschuifbaar geleide wagen, een aan een voeteinde van de wagen aangebracht heforgaan, aandrijfmiddelen voor het ten opzichte van de kolom in de langsrichting verplaatsen van de wagen en besturingsmiddelen voor de aandrijfmiddelen omvat, waarbij de hefinrichting voorzien is van koppelleidingen voor het koppelen van de besturingsmiddelen van de kolommen en met de koppelleidingen verbonden bedieningsmiddelen voor althans het gelijktijdig bedienen van de besturingsmiddelen van alle hefkolommen, **met het kenmerk,** dat de koppelleidingen deel uitmaken van een digitale databus en de bedienings- en besturingsmiddelen zodanig zijn ingericht dat deze digitale stuursignalen via deze databus uitwisselen.

2. Hefinrichting volgens conclusie 1, waarbij elke hefkolom beveiligingsmiddelen omvat voor het bij activering daarvan uitschakelen van de aandrijfmiddelen, waarbij de beveiligingsmiddelen eveneens digitale stuursignalen via de databus uitwisselen.

3. Hefinrichting volgens conclusie 1 of 2, waarbij de digitale databus van het tweedraads CAN-type is.

4. Hefinrichting volgens één van de voorgaande conclusies, waarbij alle hefkolommen door de koppelleidingen in een gesloten kring zijn geschakeld.

5. Hefinrichting volgens één van de voorgaande conclusies, waarbij elke hefkolom bedieningsmiddelen omvat en schakelmiddelen zijn voorzien voor het als bedieningsmiddelen voor de gehele hefinrichting inschakelen van specifieke besturingsmiddelen van een hefkolom.

6. Hefinrichting volgens één van de voorgaande conclusies, waarbij ten minste één hefkolom voorzien is

van een elektrische voedingsaansluiting en een aantal andere hefkolommen niet, en de koppelleidingen elektrische voedingsleidingen omvatten.

7. Hefinrichting volgens één van de voorgaande conclusies, waarbij de bedienings- en besturingsmiddelen zodanig zijn ingericht dat deze na het aanbrengen van de koppelmiddelen een voor adressering van de stuursignalen bestemd volgnummer aan elk van de hefkolommen toekennen.

8. Hefinrichting volgens één van de voorgaande conclusies, waarbij de bedienings- en besturingsmiddelen instelorganen omvatten voor het tot afzonderlijk bedienbare paren aan elkaar toevoegen van bepaalde hefkolommen.

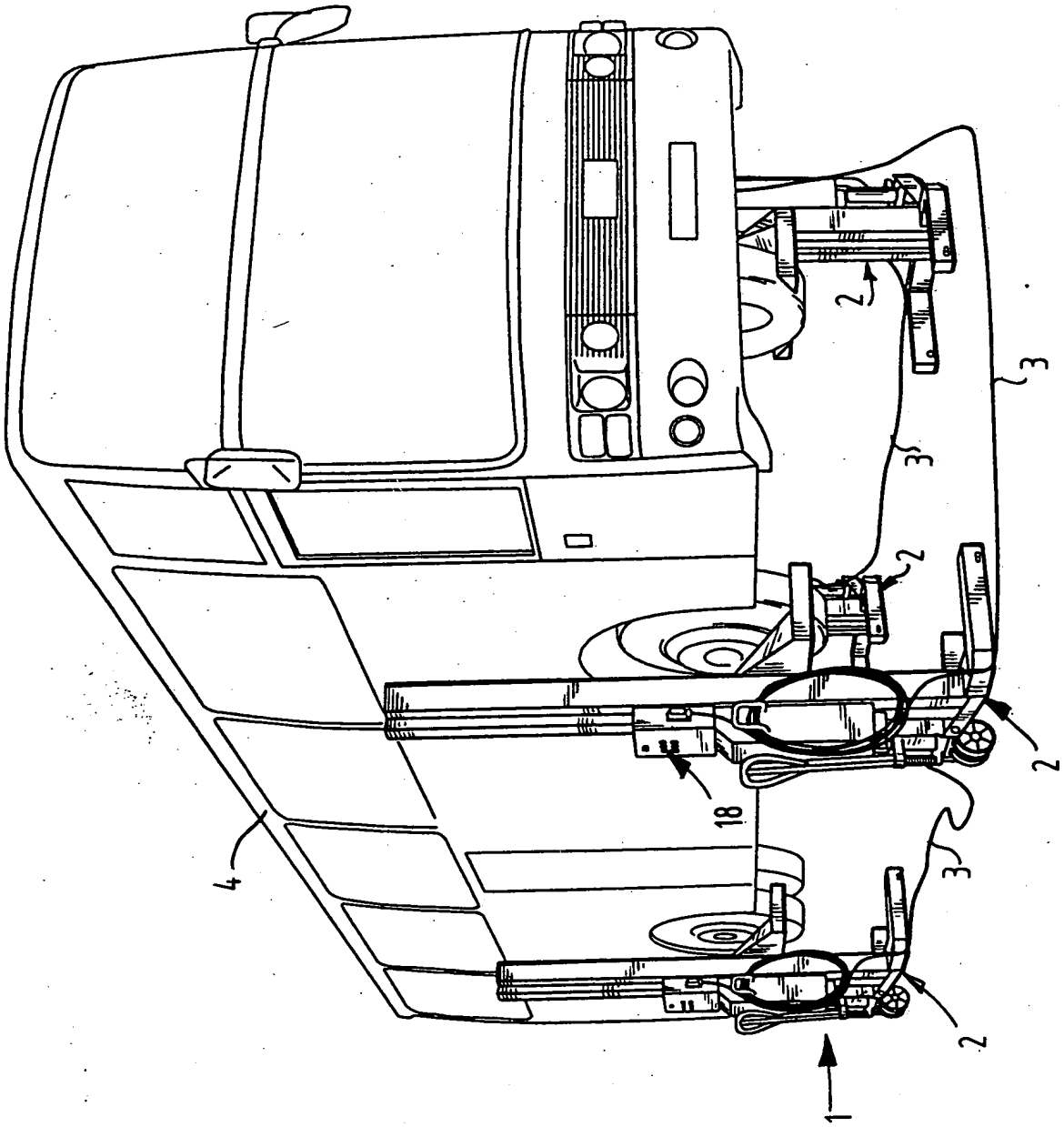
9. Hefinrichting volgens conclusie 7 en 8, waarbij de instelorganen bepaalde hefkolommen aan elkaar toevoegen door het in de besturingsmiddelen registreren van de respectieve volgnummers van de aan elkaar toegevoegde hefkolommen.

10. Hefinrichting volgens conclusie 9, waarbij in een bepaalde richting naastliggende hefkolommen van elk van de aan elkaar toegevoegde hefkolommen, tot een afzonderlijk bedienbaar paar aan elkaar worden toegevoegd.

Uittreksel

De uitvinding betreft een hefinrichting omvattende ten minste twee afzonderlijk verplaatsbare hefkolommen die elk een van een steunvoet voorziene kolom, een in langsrichting van deze kolom verschuifbaar geleide wagen, een aan een voeteinde van de wagen aangebracht heforgaan, aandrijfmiddelen voor het ten opzichte van de kolom in de langsrichting verplaatsen van de wagen en besturingsmiddelen voor de aandrijfmiddelen omvat. De hefinrichting is voorzien van koppelleidingen voor het koppelen van de besturingsmiddelen van de kolommen en met de koppelleidingen verbonden bedieningsmiddelen voor althans het gelijktijdig bedienen van de besturingsmiddelen van alle hefkolommen. De koppelleidingen maken deel uit van een digitale databus en de bedienings- en besturingsmiddelen zijn zodanig ingericht dat deze digitale stuursignalen via deze databus uitwisselen.

FIG.1



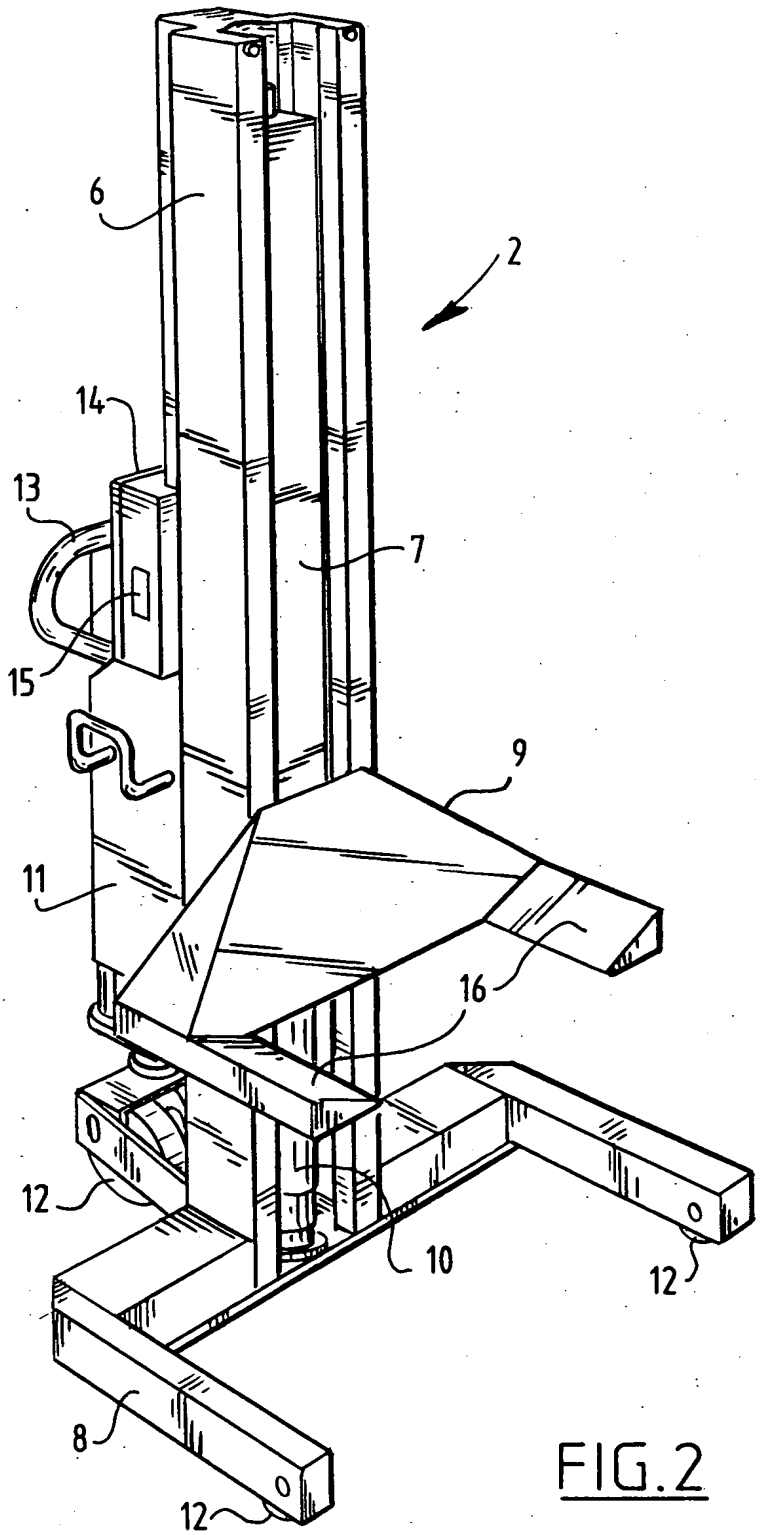


FIG.2

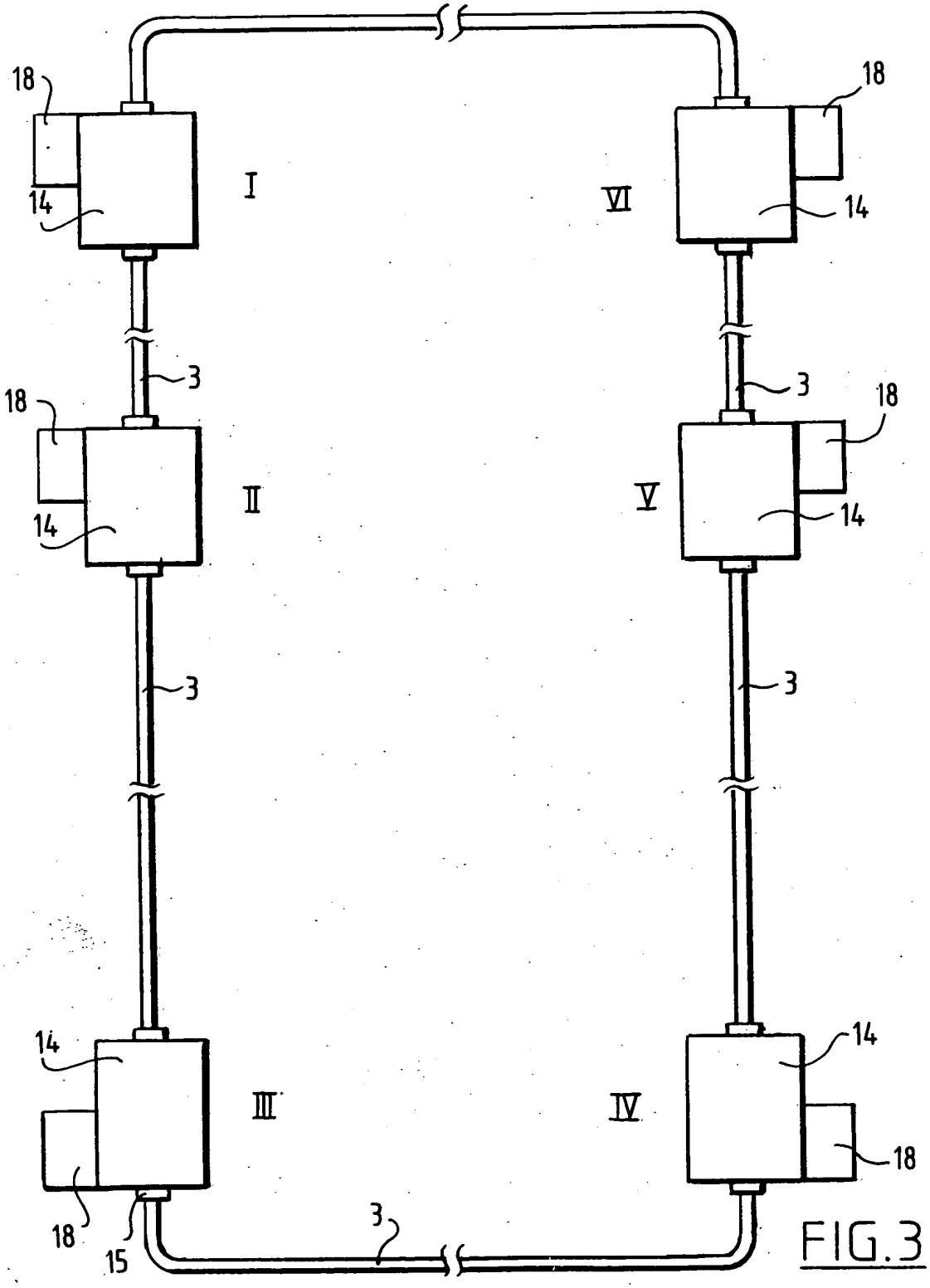


FIG.3

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Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

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INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/NL 98/00014

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B66F3/46

According to International Patent Classification(IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B66F

Documentation searched other than minimumdocumentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 747 535 A (BILFINGER BERGER BAU) 11 December 1996 see claim 1	1
A	AT 325 811 A (DICKERTMANN HEBEZEUGFAB AG) 10 November 1975 see page 3, line 1-10; figure 2	1
A	DE 36 18 072 A (GERB ELEKTRONIK GMBH) 3 December 1987 see column 3, line 1-4 - column 3, line 47-56	1
A	US 4 484 264 A (FRIEDLI PAUL ET AL) 20 November 1984 see column 3, line 12-32	1

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publicationdate of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

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Date of the actual completion of theinternational search	Date of mailing of the international search report
27 April 1998	08/05/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Gussem, J

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INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/NL 98/00014

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category ³	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 622 551 A (KUPERSMITH BERTRAM F ET AL) 11 November 1986 see claim 1	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

Inter ional Application No
PCT/NL 98/00014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0747535 A	11-12-96	DE 29507608 U	27-07-95
		DE 19611573 A	14-11-96
AT 325811 A	10-11-75	NONE	
DE 3618072 A	03-12-87	NONE	
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		AU 7658181 A	29-04-82
		BR 8106714 A	06-07-82
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		JP 8015271 B	14-02-96
		JP 60173951 A	07-09-85

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
T-13		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/NL98/00014	08/01/1998	08/01/1997
International Patent Classification (IPC) or national classification and IPC B66F3/46		
Applicant STERTIL B.V. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☒ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
10/08/1998	24.03.99
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. (+49-89) 2399-0 Tx: 523656 epmu d Fax: (+49-89) 2399-4465	Authorized officer Blumenberg, C Telephone No. (+49-89) 2399 2893

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/NL98/00014

I. Basis of the report

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

Description, pages:

1c,2-5,6*	as originally filed			
1a-1b*	as received on	02/12/1998	with letter of	02/12/1998

Claims, No.:

1-10	as received on	02/12/1998	with letter of	02/12/1998

Drawings, sheets:

1/3-3/3	as originally filed

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

4. Additional observations, if necessary:

see separate sheet

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	2,3,4,6,8,9,10
	No:	Claims	1,5,7
Inventive step (IS)	Yes:	Claims	8,9
	No:	Claims	2,3,4,6
Industrial applicability (IA)	Yes:	Claims	1-10
	No:	Claims	

2. Citations and explanations

see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item I

Basis of the report

The examination is being carried out on the following application documents:

Text for the Contracting States:
AT BE CH DE DK ES FI FR GB GR IT IE LI LU MC NL PT SE

Description, pages:

1c,2-5,6*	as originally filed			
1a-1b*	as received on	02/12/1998	with letter of	02/12/1998

Claims, No.:

1-10	as received on	02/12/1998	with letter of	02/12/1998

Drawings, sheets:

1/3-3/3	as originally filed

Comments:

* Description page 1c corresponds to description page 1 originally filed from line 30-32 and description pages 1a and 1b corresponds to description pages 1 and 2 filed with letter dated 02.12.1998.

Re Item V
Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. The present application does not meet the requirements of Article 33 (2)PCT, because the subject-matter of claims 1,5 and 7 is not new.

   The closest prior art is seen in EP-A-747535. This document discloses particularly

in claim 1 the features of claim 1. The features of claim 5 are disclosed in figure 1 and the corresponding description. The feature of claim 7 is also obligatory in order to identify the lifting columns.

It is pointed out that although claim 1 is now directed to a lifting device for vehicles, the device remains a lifting device for the skilled man and it does not make any difference if it is used for lifting houses as already disclosed in EP-A-747535 or for lifting other loads.

2. The present application does not meet the requirements of Articles 33 (3), because the subject-matter of claims 2,3,4 and 6 does not involve an inventive step in the sense of Article 33(3) PCT.

2.1. With respect to claim 4:
At-A-325811 discloses in figure 2 and in the corresponding description the feature of claim 4.

2.2. With respect to claims 2,3 and 6:
The feature of claims 2,3 and 6 are a matter of normal design procedure. Its inclusion in the lifting device described in document EP-A-747535 would therefore be an obvious design possibility for the skilled person in order to solve the problem posed.

Re Item VII

Certain defects in the international application

III,2.3b.Reference signs in parentheses should be inserted in the claims to increase their intelligibility, Rule 6.2 b PCT. This applies to both the preamble and characterising portion.

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B66F 3/46 — A1

(11) International Publication Number: WO 98/30488

(43) International Publication Date: 16 July 1998 (16.07.98)

(21) International Application Number: PCT/NL98/00014

(22) International Filing Date: 8 January 1998 (08.01.98)

(30) Priority Data:
1004956 8 January 1997 (08.01.97) NL

(71) Applicant *(for all designated States except US)*: STERTIL B.V. [NL/NL]; Westkern 3, NL–9288 CA Kootstertille (NL).

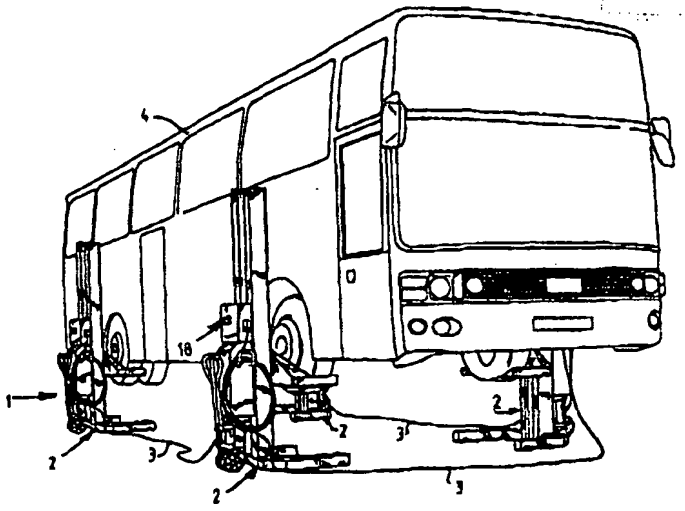
(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: BERENDS, Jan [NL/NL]; De Zeilen 29, NL–9285 ML Buitenpost (NL). DE JONG, Jurjen, Jan [NL/NL]; Waterlelie 6, NL–9285 LB Buitenpost (NL).

(74) Agent: 'T JONG, Bastiaan, Jacobus; Arnold & Siedsma, Sweelinckplein 1, NL–2517 GK The Hague (NL).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.
In English translation (filed in Dutch).

(54) Title: LIFTING DEVICE WITH MOVABLE LIFTING COLUMNS



(57) Abstract

The invention relates to a lifting device (1) comprising at least two separately displaceable lifting columns (2) which each comprise a column (2) provided with a support foot (8), a carriage (7) guided slidably in longitudinal direction of this column (2), a lifting member (9) arranged on a foot end of the carriage (7), drive means (10) for displacing the carriage (7) in longitudinal direction relative to the column (2) and control means (14) for the drive means (10). The lifting device (1) is provided with connecting lines (3) for connecting the control means (14) of the columns (2) and operating means (18) connected to the connecting lines (3) for at least simultaneous operation of the control means (14) of all lifting columns (2). The connecting lines (3) form part of a digital data bus and the operating (18) and control means (14) are adapted such that they exchange digital control signals via this data bus.

LIFTING DEVICE WITH MOVABLE LIFTING COLUMNS

The invention relates to a lifting device which comprises at least two separately displaceable lifting columns, as described in the preamble of claim 1.

Such a lifting device is known and is used particularly for lifting heavy vehicles, such as trucks and buses.

The signals required to cause all lifting columns to operate as a unit are transmitted with the connecting lines. These signals comprise activating signals for switching on and off the drive means of each lifting column and also monitoring signals for comparing the lifting height of each lifting column. The lifting columns are thus mutually coupled by the connecting lines to form one lifting device which functions in substantially the same manner as a customary vehicle lift.

The invention has for its object to further develop the known lifting device in order to give it more application options.

This object is achieved in the lifting device according to the invention with the steps characterized in claim 1. The lifting columns are hereby no longer considered as composite parts of a whole device but as separate devices which co-act in random numbers. With the invention is achieved that a wide diversity of control and monitoring signals can be exchanged between the separate lifting columns mutually and with the operating means, whereby the options for use of the lifting device according to the invention are greatly increased.

A favourable further development is characterized in claim 2. Also communicating the safety signals via the data bus ensures that a random number of

co-acting lifting columns can co-act reliably and, in particular, with great safety.

The measure of claim 3 is preferably applied. The CAN data bus and components therefor are well standardized, so that the control and operating means can be constructed and embodied in reliable manner. Because this data bus only requires two wires, the connecting lines remain well manageable and little vulnerable.

Applying the measure of claim 4 achieves that the proper operation of all lifting columns can be ascertained from the operating means. Control signals for setting the safety means into operation can be transmitted in one direction in the closed circuit, which results in a high reliability.

According to a further development the measure of claim 5 is applied. The user can select the lifting column which is most suitable for him for the operation of the whole device.

With the measure of claim 6 the energy supply for each, or at least a number of the lifting columns can take place via the at least one lifting column. It is possible for instance to dimension the supply voltage lines such that a total of four lifting columns are supplied via the one lifting column. The at least one lifting column can herein be provided with overload protection means which ensure switching off of the power supply in the case of overload of several or all coupled lifting columns.

In a suitable embodiment the measure of claim 7 is applied. The relative position of each lifting column is hereby easily identifiable by the operating means.

A very suitable further application is characterized in claim 8. As pairs are for instance designated the lifting columns which are disposed on either side of the same vehicle axle. It hereby becomes possible, when a vehicle is supported by more than four lifting columns, for instance to build in or remove an

axle by independently operating the two lifting columns forming part of one pair.

With the measure of claim 9 the separate operation of the lifting columns mutually associated to form a pair can be performed in simple manner from the operating means.

After adjustment of one of the pairs, the other co-acting pairs can be identified simply by the operating means by applying the measure of claim 12.

The invention is further elucidated in the following description with reference to the annexed figures.

Figure 1 shows a lifting device of the present type in the position of use.

Figure 2 shows a lifting column of the lifting device of figure 1.

Figure 3 shows schematically six lifting columns mutually coupled by connecting lines.

The lifting device 1 according to the invention shown in figure 1 comprises four separately displaceable lifting columns 2 which co-act to lift a bus 4. For the co-action the lifting columns 2 are mutually coupled by means of connecting lines 3 which form part of a digital data bus of the CAN type.

As shown in figure 2, each lifting column 2 comprises a column 6 in which a carriage 7 is guided slidably in longitudinal direction. On the bottom end of column 6 is arranged a support foot 8 with which the column can be deployed stably on a ground surface.

Carriage 7 bears on its lower end a lifting member 9 which is provided with two protrusions 16 which can engage around a vehicle wheel. Carriage 7 can be displaced in column 6 by means of drive means in the form of a hydraulic cylinder 10. This hydraulic cylinder 10 is fed with hydraulic oil under pressure from a hydraulic unit 11, which is per se known and not shown in detail.

Such a hydraulic unit 11 comprises a hydraulic pump driven by an electric motor, which can draw hydraulic oil out of a reservoir and press it under pressure into cylinder 10 in order to move the carriage 7 upward.

Control of hydraulic unit 11 takes place with per se known control means which are accommodated in a box 14 on lifting column 2.

In order to enable displacement of lifting column 2 and positioning with protrusions 16 on either side of a vehicle wheel, the lifting column 2 is provided with wheels 12. These wheels 12 form together with push-bar 13 a mechanism which is per se known for pallet trucks. By moving push-bar 13 up and downward in pumping manner the wheels 12 can be moved downward relative to support foot 8 whereby lifting column 2 becomes displaceable on wheels 12. By operating a hydraulic valve the wheels 12 are retracted, whereby support foot 8 comes to lie on the ground.

In the mobile situation the lifting column 2 can be manoeuvred using push-bar 13.

Control means 14 comprise per se known switching means for switching on and off hydraulic unit 11. This switch-on/off command is given by activating the operating means 18. Control means 14 for each lifting column 2 and the operating means 18 are embodied such that they can exchange signals via the connecting lines 3.

As shown in figure 1, each of the lifting columns is provided with a length of line 3 which carries on its end a connector which is connected to a connector terminal 15 of an adjacent lifting column 2. Control means 14 and operating means 18 are thus connected in a series as shown in figure 3 for a lifting device comprising six lifting columns.

In the shown embodiment two conductors in connecting lines 3 form parts in each case of a digital CAN data bus. Connecting lines 3 can further comprise conductors for the supply current of the hydraulic units.

Because the control means and operating means are mutually coupled by means of the CAN data bus, a variety of signals can be sent to and from each lifting column. For a good co-action with the CAN data bus the control means are based on a microprocessor, so that the different options can be entered by programming.

A suitable possibility, which can be applied particularly when more than four lifting columns are used, is to cause determined lifting columns to be raised and lowered independently. The two lifting columns deployed on either side of an axle of a vehicle can for instance be jointly moved upward and downward, while others retain the adjusted height, for the purpose of changing a vehicle axle.

For this purpose a serial number is assigned to each of the lifting columns for addressing the control signals. In figure 3 these serial numbers are designated schematically with I-VI. Assigning of these serial numbers can take place simply after arranging connecting lines 3. Operating means 18 can perform a program-controlled query over the data bus in order to establish how many lifting columns are connected to the data bus and subsequently assign the serial number to each of these lifting columns. The software can be embodied such that the lifting columns associated in each case with one axle are then mutually associated to form independently operable pairs. In the diagram of figure 3 the lifting columns designated II and V can for instance be operated in suitable manner as a separate pair in order to move an axle supported by these lifting columns separately upward and downward.

Figure 3 shows that each column bears operating means 18, so that the whole lifting device can be operated at each column. It is also possible to embody the operating means 18 as a separate unit which can exchange signals with control means 14 via a cable connection. The cable connection can for instance be made as required with a random column.

As shown in figure 3, the connecting lines 3 are connected in a closed circuit, wherein one lifting column in each case is connected to a subsequent one. Control and safety signals can hereby be fed back via the closed circuit to the operational operating means 18, whereby monitoring of the proper operation of all connected columns becomes possible and the data flow can for instance take place in one direction, which results in a simple and therefore reliable embodiment.

Mutually associating determined lifting columns to form an independently operable pair can also take place in a less well developed embodiment of the invention in that an operator enters data concerning the co-acting columns into the control means. Each lifting column can thus be provided with an independently actuable adjusting member which, after actuation, places the device in a learning mode. If within a determined time after actuation of the adjusting member on one column a corresponding adjusting member on another column is actuated, the control device will mutually associate these two columns to form an independently operable pair.

The invention is not limited to the embodiments shown in the figures and described above. Through use of the digital data bus in combination with suitable programming of the control and operating means a lifting device can be given the functionality desired for a particular application.

CLAIMS

1. Lifting device comprising at least two separately displaceable lifting columns which each comprise a column provided with a support foot, a carriage guided slidably in longitudinal direction of this column, a lifting member arranged on a foot end of the carriage, drive means for displacing the carriage in longitudinal direction relative to the column and control means for the drive means, wherein the lifting device is provided with connecting lines for connecting the control means of the columns and operating means connected to the connecting lines for at least simultaneous actuation of the control means of all lifting columns, characterized in that the connecting lines form part of a digital data bus and the operating and control means are adapted such that they exchange digital control signals via this data bus.

2. Lifting device as claimed in claim 1, wherein each lifting column comprises safety means for switching off the drive means on activation thereof, wherein the safety means likewise exchange digital control signals via the data bus.

3. Lifting device as claimed in claim 1 or 2, wherein the digital data bus is of the two-wire CAN type.

4. Lifting device as claimed in any of the foregoing claims, wherein all lifting columns are connected by the connecting lines in a closed circuit.

5. Lifting device as claimed in any of the foregoing claims, wherein each lifting column comprises operating means and switching means are provided for switching on specific control means of a lifting column as operating means for the whole lifting device.

6. Lifting device as claimed in any of the foregoing claims, wherein at least one lifting column is provided with an electrical power supply connection and a number of other lifting columns are not, and the connecting lines comprise electrical supply lines.

7. Lifting device as claimed in any of the foregoing claims, wherein the operating and control means are adapted such that, after arranging of the connecting means, they assign to each of the lifting columns a serial number intended for addressing of the control signals.

8. Lifting device as claimed in any of the foregoing claims, wherein the operating and control means comprise adjusting members for mutually associating determined lifting columns to form independently operable pairs.

9. Lifting device as claimed in claims 7 and 8, wherein the adjusting members mutually associate determined lifting columns by recording in the control means the respective serial numbers of the mutually associated lifting columns.

10. Lifting device as claimed in claim 9, wherein lifting columns of each of the mutually associated lifting columns standing adjacently in a determined direction are mutually associated to form an independently operable pair.

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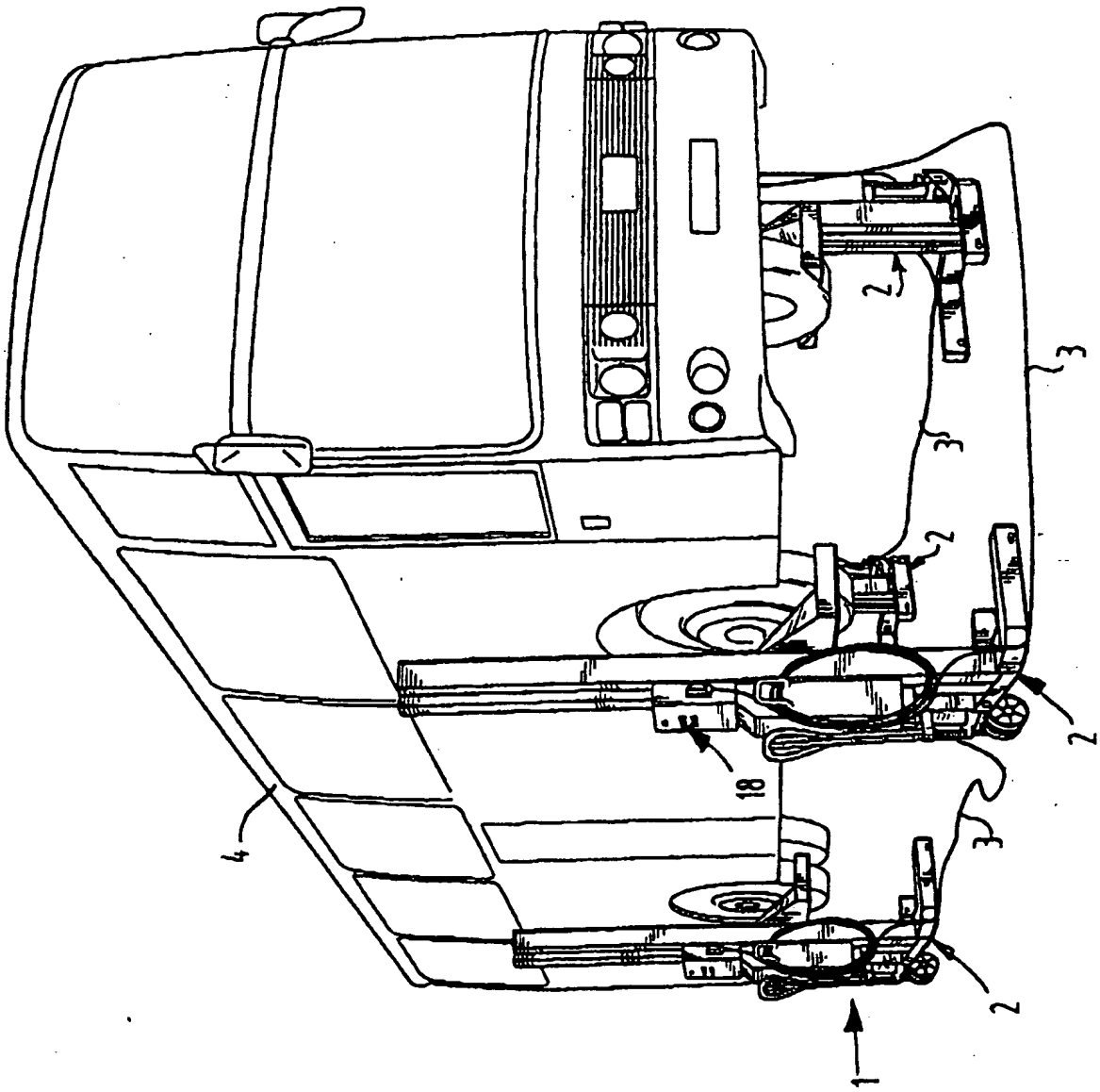
FIG.1



WO 98/30488 PCT/NL98/00014

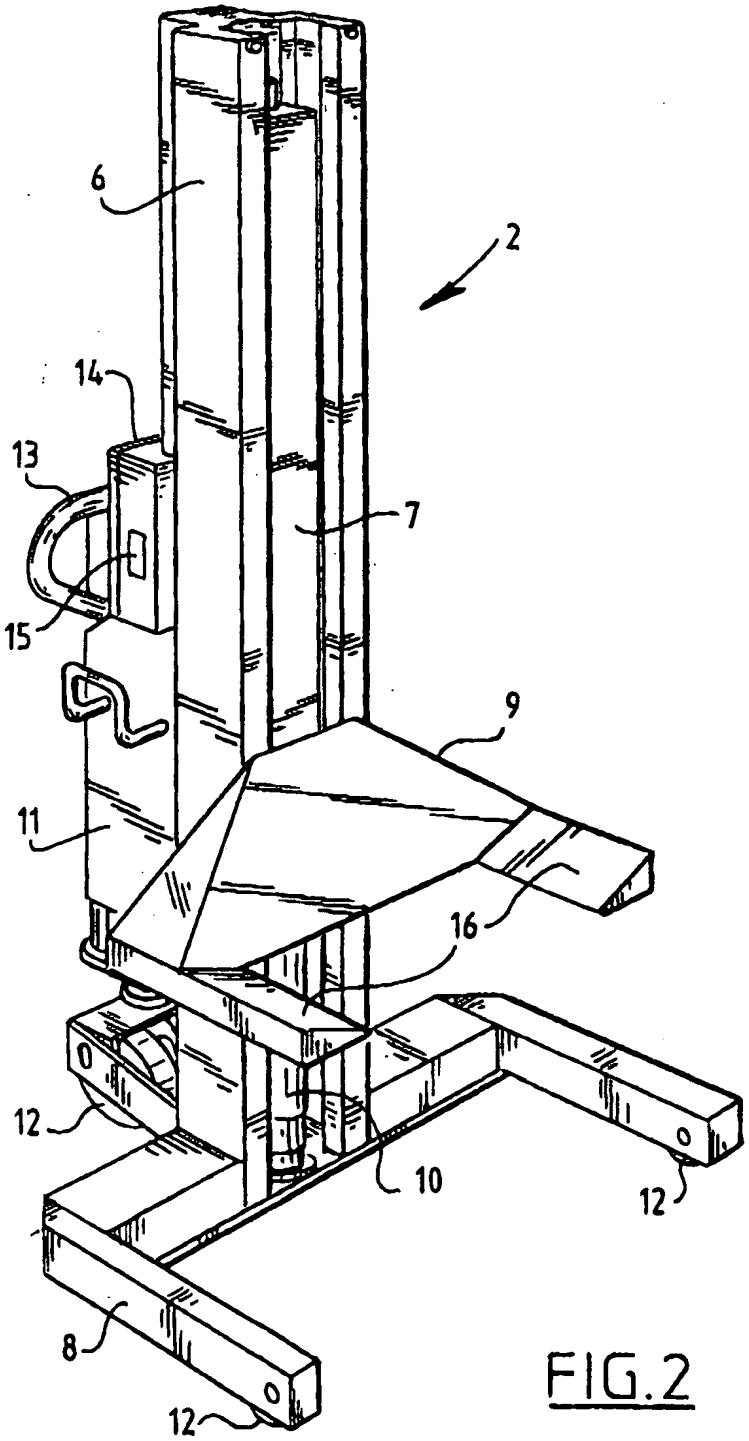


FIG.2

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FIG.3

INTERNATIONAL SEARCH REPORT

Inte onal Application No
PCT/NL 98/00014

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B66F3/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B66F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 747 535 A (BILFINGER BERGER BAU) 11 December 1996 see claim 1	1
A	AT 325 811 A (DICKERTMANN HEBEZEUGFAB AG) 10 November 1975 see page 3, line 1-10; figure 2	1
A	DE 36 18 072 A (GERB ELEKTRONIK GMBH) 3 December 1987 see column 3, line 1-4 - column 3, line 47-56	1
A	US 4 484 264 A (FRIEDLI PAUL ET AL) 20 November 1984 see column 3, line 12-32	1

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 April 1998	08/05/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Gussem, J

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Inter onal Application No
PCT/NL 98/00014

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 622 551 A (KUPERSMITH BERTRAM F ET AL) 11 November 1986 see claim 1	1

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

...formation on patent family members

Inter ...onal Application No
PCT/NL 98/00014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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AT 325811 A	10-11-75	NONE	
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		AT 7968 T	15-06-84
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		AU 7658181 A	29-04-82
		BR 8106714 A	06-07-82
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		JP 60000703 B	09-01-85
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		JP 5347611 A	27-12-93
		JP 8015271 B	14-02-96
		JP 60173951 A	07-09-85

co-acting lifting columns can co-act reliably and, in particular, with great safety.

The measure of claim 3 is preferably applied. The CAN data bus and components therefor are well standardized, so that the control and operating means can be constructed and embodied in reliable manner. Because this data bus only requires two wires, the connecting lines remain well manageable and little vulnerable.

Applying the measure of claim 4 achieves that the proper operation of all lifting columns can be ascertained from the operating means. Control signals for setting the safety means into operation can be transmitted in one direction in the closed circuit, which results in a high reliability.

According to a further development the measure of claim 5 is applied. The user can select the lifting column which is most suitable for him for the operation of the whole device.

With the measure of claim 6 the energy supply for each, or at least a number of the lifting columns can take place via the at least one lifting column. It is possible for instance to dimension the supply voltage lines such that a total of four lifting columns are supplied via the one lifting column. The at least one lifting column can herein be provided with overload protection means which ensure switching off of the power supply in the case of overload of several or all coupled lifting columns.

In a suitable embodiment the measure of claim 7 is applied. The relative position of each lifting column is hereby easily identifiable by the operating means.

A very suitable further application is characterized in claim 8. As pairs are for instance designated the lifting columns which are disposed on either side of the same vehicle axle. It hereby becomes possible, when a vehicle is supported by more than four lifting columns, for instance to build in or remove an

axle by independently operating the two lifting columns forming part of one pair.

With the measure of claim 9 the separate operation of the lifting columns mutually associated to form a pair can be performed in simple manner from the operating means.

After adjustment of one of the pairs, the other co-acting pairs can be identified simply by the operating means by applying the measure of claim 12.

The invention is further elucidated in the following description with reference to the annexed figures.

Figure 1 shows a lifting device of the present type in the position of use.

Figure 2 shows a lifting column of the lifting device of figure 1.

Figure 3 shows schematically six lifting columns mutually coupled by connecting lines.

The lifting device 1 according to the invention shown in figure 1 comprises four separately displaceable lifting columns 2 which co-act to lift a bus 4. For the co-action the lifting columns 2 are mutually coupled by means of connecting lines 3 which form part of a digital data bus of the CAN type.

As shown in figure 2, each lifting column 2 comprises a column 6 in which a carriage 7 is guided slidably in longitudinal direction. On the bottom end of column 6 is arranged a support foot 8 with which the column can be deployed stably on a ground surface.

Carriage 7 bears on its lower end a lifting member 9 which is provided with two protrusions 16 which can engage around a vehicle wheel. Carriage 7 can be displaced in column 6 by means of drive means in the form of a hydraulic cylinder 10. This hydraulic cylinder 10 is fed with hydraulic oil under pressure from a hydraulic unit 11, which is per se known and not shown in detail.

Such a hydraulic unit 11 comprises a hydraulic pump driven by an electric motor, which can draw hydraulic oil out of a reservoir and press it under pressure into cylinder 10 in order to move the carriage 7 upward.

Control of hydraulic unit 11 takes place with per se known control means which are accommodated in a box 14 on lifting column 2.

In order to enable displacement of lifting column 2 and positioning with protrusions 16 on either side of a vehicle wheel, the lifting column 2 is provided with wheels 12. These wheels 12 form together with push-bar 13 a mechanism which is per se known for pallet trucks. By moving push-bar 13 up and downward in pumping manner the wheels 12 can be moved downward relative to support foot 8 whereby lifting column 2 becomes displaceable on wheels 12. By operating a hydraulic valve the wheels 12 are retracted, whereby support foot 8 comes to lie on the ground.

In the mobile situation the lifting column 2 can be manoeuvred using push-bar 13.

Control means 14 comprise per se known switching means for switching on and off hydraulic unit 11. This switch-on/off command is given by activating the operating means 18. Control means 14 for each lifting column 2 and the operating means 18 are embodied such that they can exchange signals via the connecting lines 3.

As shown in figure 1, each of the lifting columns is provided with a length of line 3 which carries on its end a connector which is connected to a connector terminal 15 of an adjacent lifting column 2. Control means 14 and operating means 18 are thus connected in a series as shown in figure 3 for a lifting device comprising six lifting columns.

In the shown embodiment two conductors in connecting lines 3 form parts in each case of a digital CAN data bus. Connecting lines 3 can further comprise conductors for the supply current of the hydraulic units.

Because the control means and operating means are mutually coupled by means of the CAN data bus, a variety of signals can be sent to and from each lifting column. For a good co-action with the CAN data bus the control means are based on a microprocessor, so that the different options can be entered by programming.

A suitable possibility, which can be applied particularly when more than four lifting columns are used, is to cause determined lifting columns to be raised and lowered independently. The two lifting columns deployed on either side of an axle of a vehicle can for instance be jointly moved upward and downward, while others retain the adjusted height, for the purpose of changing a vehicle axle.

For this purpose a serial number is assigned to each of the lifting columns for addressing the control signals. In figure 3 these serial numbers are designated schematically with I-VI. Assigning of these serial numbers can take place simply after arranging connecting lines 3. Operating means 18 can perform a program-controlled query over the data bus in order to establish how many lifting columns are connected to the data bus and subsequently assign the serial number to each of these lifting columns. The software can be embodied such that the lifting columns associated in each case with one axle are then mutually associated to form independently operable pairs. In the diagram of figure 3 the lifting columns designated II and V can for instance be operated in suitable manner as a separate pair in order to move an axle supported by these lifting columns separately upward and downward.

Figure 3 shows that each column bears operating means 18, so that the whole lifting device can be operated at each column. It is also possible to embody the operating means 18 as a separate unit which can exchange signals with control means 14 via a cable connection. The cable connection can for instance be made as required with a random column.

As shown in figure 3, the connecting lines 3 are connected in a closed circuit, wherein one lifting column in each case is connected to a subsequent one. Control and safety signals can hereby be fed back via the closed circuit to the operational operating means 18, whereby monitoring of the proper operation of all connected columns becomes possible and the data flow can for instance take place in one direction, which results in a simple and therefore reliable embodiment.

Mutually associating determined lifting columns to form an independently operable pair can also take place in a less well developed embodiment of the invention in that an operator enters data concerning the co-acting columns into the control means. Each lifting column can thus be provided with an independently actuable adjusting member which, after actuation, places the device in a learning mode. If within a determined time after actuation of the adjusting member on one column a corresponding adjusting member on another column is actuated, the control device will mutually associate these two columns to form an independently operable pair.

The invention is not limited to the embodiments shown in the figures and described above. Through use of the digital data bus in combination with suitable programming of the control and operating means a lifting device can be given the functionality desired for a particular application.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 28 August 1998 (28.08.98)	
International application No. PCT/NL98/00014	**Applicant's or agent's file reference** T-13
International filing date (day/month/year) 08 January 1998 (08.01.98)	**Priority date** (day/month/year) 08 January 1997 (08.01.97)
Applicant BERENDS, Jan et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

10 August 1998 (10.08.98)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
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S. De Michiel

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference T-13	**FOR FURTHER ACTION** see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NL 98/ 00014	International filing date *(day/month/year)* 08/01/1998	(Earliest) Priority Date *(day/month/year)* 08/01/1997
Applicant STERTIL B.V. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. [ ] **Certain claims were found unsearchable** (see Box I).

2. [ ] **Unity of invention is lacking** (see Box II).

3. [ ] The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing
   - [ ] filed with the international application.
   - [ ] furnished by the applicant separately from the international application,
     - [ ] but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.
   - [ ] Transcribed by this Authority

4. With regard to the **title,**
   - [X] the text is approved as submitted by the applicant
   - [ ] the text has been established by this Authority to read as follows:

5. With regard to the **abstract,**
   - [ ] the text is approved as submitted by the applicant
   - [X] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:
   Figure No. 1
   - [X] as suggested by the applicant.
   - [ ] because the applicant failed to suggest a figure.
   - [ ] because this figure better characterizes the invention.
   - [ ] None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/NL 98/ 00014

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The invention related to a lifting device (1) comprising at least two separately displaceable lifting columns (2) which each comprise a column (2) provided with a support foot (8), a carriage (7) guided slidably in longitudinal direction of this column (2), a lifting member(9) arranged on a foot end of the carriage (7), drive means (10) for displacing the carriage (7) in longitudinal direction relative to the column (2) and control means (14) for the drive means (10). the lifting device (1) is provided with connecting lines (3) for connecting the control means (14) of the columns (2) and operating means (18) connected to the connecting lines (3) for at least simultaneous operation of the control means (14) of all lifting columns (2). The connecting lines (3) form part of a digital data bus and the operating (18) and control means (14) are adapted such that they exhange digital control signals via this data bus.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 98/00014

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B66F3/46

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B66F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 747 535 A (BILFINGER BERGER BAU) 11 December 1996 see claim 1	1
A	AT 325 811 A (DICKERTMANN HEBEZEUGFAB AG) 10 November 1975 see page 3, line 1-10; figure 2	1
A	DE 36 18 072 A (GERB ELEKTRONIK GMBH) 3 December 1987 see column 3, line 1-4 - column 3, line 47-56	1
A	US 4 484 264 A (FRIEDLI PAUL ET AL) 20 November 1984 see column 3, line 12-32	1

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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1

Date of the actual completion of the international search	Date of mailing of the international search report
27 April 1998	08/05/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	De Gussem, J

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 622 551 A (KUPERSMITH BERTRAM F ET AL) 11 November 1986 see claim 1	1

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/NL 98/00014

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0747535 A	11-12-96	DE 29507608 U	27-07-95
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US 4484264 A	20-11-84	CH 651950 A	15-10-85
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